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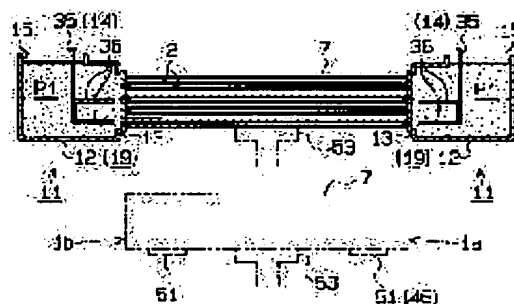
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(54) END FACE SEALING SYSTEM AND MANUFACTURE OF HONEYCOMB FILTER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method for manufacturing a honeycomb filter capable of enhancing productivity and cost performance.

SOLUTION: First, through holes 2 formed on the both end faces 1a, 1b of a honeycomb molding 7 are sealed with a sealant P1. In this case, the honeycomb molding 7 is retained between a pair of opposing filling devices 11 by pressing the honeycomb molding 7 from its both end faces 1a, 1b sealant P1 is packed into the through holes 2 in such a state. Following this step, the honeycomb molding 7 after its end faces are sealed, is backed to obtain the honeycomb filter.



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CLAIMS

[Claim(s)]

[Claim 1] A conveyance means to be the end-face closure system which closes the end face of a closure-ed object by being filled up with a viscous sealing agent, and to convey said closure-ed object in the predetermined direction, The end-face closure system characterized by having restoration equipment of the pair by which opposite arrangement was carried out as sandwiched that conveyance means, holding a **** closure object by pressing said closure-ed object from that both-ends side side with the restoration equipment of said pair, and filling up said sealing agent with this condition.

[Claim 2] It is the end-face closure system according to claim 1 characterized by performing restoration of said sealing agent to coincidence by the restoration equipment of said pair.

[Claim 3] Said conveyance means is what conveys said closure-ed object in the condition every width. Said restoration equipment The open container into which said sealing agent is put, and the mask installed in the side face of said open container, The mask has opening in the location corresponding to the through tube which carries out opening in the end face of said closure-ed object, The end-face closure system according to claim 1 or 2 characterized by having an oscillating grant means to send out this sealing agent to the outside of said mask through said opening by giving vibration to said sealing agent.

[Claim 4] In the manufacture approach of a honeycomb filter including the process which closes the through tube which carries out opening in the both-ends side of a honeycomb Plastic solid using a sealing agent, and the process which calcinates said honeycomb Plastic solid after the end-face closure The manufacture approach of the honeycomb filter characterized by holding this honeycomb Plastic solid and performing restoration of said sealing agent into said through tube in this condition by pressing said honeycomb Plastic solid from that both-ends side side at said closure process with the restoration equipment of the pair by which opposite arrangement was carried out.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the end-face closure system which closes the end face of a closure-ed object, and a honeycomb filter by being filled up with a viscous sealing agent.

[0002]

[Description of the Prior Art] In recent years, on the exhaust air path of the diesel power plant carried in the automobile, the honeycomb filter made from a ceramic sintered compact is prepared as a means for purifying exhaust gas in many cases. Such a honeycomb filter is equipped with many cels. Moreover, in order to form said cel, it is necessary to close the through tube of a large number which a honeycomb Plastic solid has in the shape of a checker. Hereafter, the manufacture procedure of the honeycomb filter in the former is explained briefly.

[0003] First, while producing a honeycomb Plastic solid by extrusion molding of a ceramic ingredient, the paste for the closures of the quality of the ceramics is prepared as a sealing agent. Subsequently, the hole which sticks the flexible film for the closures which becomes the whole end face of a honeycomb Plastic solid from paper or resin, and turns into a paste installation hole at the predetermined part of the film is formed. A film attachment side edge side is dipped into the paste for the closures in this condition. Then, a paste flows through the paste installation hole ****(ed) by the film for the closures, and the closure of the opening of a through tube is carried out. In addition, the method (pressure process) of performing paste restoration by pressurizing the paste for the closures with pressurization implements other than such a dipping method, such as a piston, etc. is learned.

[0004] End-face down stream processing, the hole correction process, etc. of having used a paste end process, the paste desiccation process, the paste correction process, the film exfoliation process, the knife, etc. like the above paste packers are carried out. Then, after performing the closure also about an other-end side in the same procedure, a honeycomb Plastic solid is calcinated. Then, both a honeycomb Plastic solid and a sealing agent sinter, and the honeycomb filter which has many cels is obtained.

[0005]

[Problem(s) to be Solved by the Invention] However, in the former, although a series of above-mentioned processes were troublesome, they were performed by the help one side every. For this reason, productivity was very bad. Moreover, since there were also many routing counters as a whole, simplification was desired.

[0006] Furthermore, in the former, since the expensive film for the closures was made throwing away, there was much futility of an ingredient and it had become one cause in which this bars improvement in cost nature. It is made in order that this invention may solve the above-mentioned technical problem, and the purpose is in offering the manufacture approach of of the end-face closure system and honeycomb filter which can aim at improvement in productivity and cost nature.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, in invention according to claim 1 A conveyance means to be the end-face closure system which closes the end face of a closure-ed object by being filled up with a viscous sealing agent, and to convey said closure-ed object in the predetermined direction, It has restoration equipment of the pair by which opposite arrangement was carried out as sandwiched the conveyance means. By pressing said closure-ed object from that both-ends side side with the restoration equipment of said pair, a **** closure object is held and let the end-face closure system

characterized by filling up said sealing agent with this condition be that summary.

[0008] In invention according to claim 2, it was presupposed in claim 1 that restoration of said sealing agent is performed to coincidence by the restoration equipment of said pair. In invention according to claim 3, said conveyance means is what conveys said closure-ed object in the condition every width in claims 1 or 2. Said restoration equipment The open container into which said sealing agent is put, and the mask installed in the side face of said open container, The mask presupposed that it has an oscillating grant means to send out this sealing agent to the outside of said mask through said opening having opening in the location corresponding to the through tube which carries out opening in the end face of said closure-ed object, and by giving vibration to said sealing agent.

[0009] In the manufacture approach of a honeycomb filter including the process which closes the through tube which carries out opening in the both-ends side of a honeycomb Plastic solid in invention according to claim 4 using a sealing agent, and the process which calcinates said honeycomb Plastic solid after the end-face closure This honeycomb Plastic solid is held by pressing said honeycomb Plastic solid from the both-ends side side at said closure process with the restoration equipment of the pair by which opposite arrangement was carried out. Let the manufacture approach of the honeycomb filter characterized by performing restoration of said sealing agent into said through tube in this condition be that summary.

[0010] Hereafter, "an operation" of this invention is explained. According to invention according to claim 1, a closure-ed object is continuously conveyed by the conveyance means. If a closure-ed object results between the restoration equipment of the pair by which opposite arrangement was carried out, both restoration equipment will press a closure-ed object from the end-face side, and a closure-ed object will be held in the state of positioning between restoration equipment. By filling up the sealing agent by restoration equipment with this condition, the closure of the end face of a closure-ed object is carried out continuously. Therefore, productivity improves compared with the former which depended for restoration on the help. Moreover, since opposite arrangement of the restoration equipment of a pair is carried out, while the conveyance means is conveying the closure-ed object, it can be filled up with a sealing agent about both end faces. Therefore, compared with the former which needed to be filled up with the sealing agent every [single-sided], the time amount which an end-face closure activity takes becomes short. Therefore, productivity improves also by this.

[0011] According to invention according to claim 2, as a result of filling up coincidence with a sealing agent with the restoration equipment of a pair, the time amount which an end-face closure activity takes becomes very short, and productivity improves more.

[0012] if atmospheric pressure has always joined the sealing agent into which it was put in the open container according to invention according to claim 3 and vibration is given to a sealing agent by the oscillating grant means in this condition -- opening -- minding -- a sealing agent -- the outside of a mask -- every [small quantity] -- it is sent out gradually. Therefore, the specified quantity and homogeneity are filled up with a sealing agent by operation of said atmospheric pressure and vibration in the predetermined part of the closure-ed object arranged on the outside of a mask.

[0013] Moreover, since the film for the closures for blockading the part which is not a restoration part becomes unnecessary according to this restoration equipment equipped with a mask, the troublesome film attachment activity and film exfoliation activity by the help are no longer required. Furthermore, as a result of filling up homogeneity with a sealing agent and a sealing agent's stopping adhering to the external surface of a closure-ed object moreover, the troublesome correction by the help is no longer required. A routing counter decreases certainly from the above thing, and productivity improves further.

[0014] Furthermore, the futility of an ingredient is lost by it becoming unnecessary to make an expensive film throwing away, and cost nature improves. If it results between the restoration equipment of a pair with which opposite arrangement of the honeycomb Plastic solid was carried out according to invention according to claim 4, both restoration equipment will press a honeycomb Plastic solid from the end-face side, and a honeycomb Plastic solid will be held in the state of positioning between restoration equipment. By filling up the sealing agent into a through tube with this condition with restoration equipment, the closure of the end face of a honeycomb Plastic solid is carried out continuously. Then, a desired honeycomb filter can be obtained by making a honeycomb Plastic solid and a sealing agent sinter according to a baking process. Therefore, productivity improves compared with the former which depended for restoration on the help. Moreover, since opposite arrangement of the restoration equipment of a pair is carried out, the time amount which an end-face

closure activity takes compared with the former becomes short certainly. Therefore, productivity improves also by this.

[0015]

[Embodiment of the Invention] One operation gestalt which materialized this invention hereafter to the manufacture approach of the honeycomb filter which used the end-face closure system is explained to a detail based on drawing 1 - drawing 10.

[0016] Honeycomb filter F1 manufactured by the manufacture approach of this operation gestalt by drawing 1 It is shown. This honeycomb filter F1 The role which removes a diesel particulate on the exhaust air path of a diesel power plant is played.

[0017] Honeycomb filter F1 The honeycomb structure object 1 to constitute is the square pole-like (this operation gestalt 33mmx33mmx 150mm), and is a product made from a ceramic sintered compact (this operation gestalt porosity silicon carbide sintered compact). In addition, silicon nitride, an alumina, cordierite, etc. can be chosen besides silicon carbide. The shape of a cross-section abbreviation square and two or more through tubes 2 are regularly formed in the honeycomb structure object 1 along the direction of an axis. Each through tube 2 is mutually separated by the wall 3. The closure of the opening of each through tube 2 is carried out to the one end-face 1a and 1b side with the closure object 4 (this operation gestalt porosity silicon carbide sintered compact), and it has become checker-like as end-face 1a and the whole 1b. Consequently, the cels 5 and 6 of the shape of a cross-section square which carries out opening in either gas inflow side edge side 1a or the effluence-of-gas side edge side 1b are formed in the honeycomb structure object 1. The oxidation catalyst which consists of platinum group metals, other metallic elements, its oxide, etc. is supported by the wall 3 of cels 5 and 6. In addition, at this operation gestalt, an average pore diameter is 14 micrometers. 0.3mm and a cel pitch are set [porosity] as 1.8mm for the thickness of a wall 3 40%, respectively.

[0018] Honeycomb filter F1 constituted as mentioned above When it has arranged for the exhaust air path, the flow of exhaust gas is as follows. It sets to drawing 1 (c) and is an arrow head A1. Exhaust gas flows in the cel 5 which carries out opening in gas inflow side edge side 1a so that it may be shown. Subsequently, exhaust gas passes a wall 3 and flows out of the adjoining cel 6 6, i.e., the cel which carries out opening in effluence-of-gas side edge side 1b. At this time, the trap of the particulate is carried out there by the particulate migration included in exhaust gas being prevented with a wall 3. Consequently, the purified exhaust gas is discharged from effluence-of-gas side edge section 1b.

[0019] Said honeycomb filter F1 In manufacture, it is necessary to form conventionally honeycomb Plastic solid 7 which has two or more through tubes 2 by the well-known extrusion method which used the slurry containing silicon carbide as the start ingredient first. Speaking concretely, with this operation gestalt, performing extrusion molding by being made from what added an organic binder and water the predetermined daily dose every, and kneaded them to silicon carbide powder. Moreover, sealing agent P1 which serves as the closure object 4 by baking (paste for the closures) For example, it is produced by kneading what mixed the silicon carbide powder 100 weight section, 1 % of the weight - 5 % of the weight of organic binders, 1 % of the weight - 5 % of the weight of lubricant, 1 % of the weight - 5 % of the weight of plasticizers, and 20 % of the weight - 30 % of the weight of water.

[0020] Next, honeycomb filter F1 of this operation gestalt The outline of the end-face closure system 41 used at the time of manufacture is explained based on drawing 2 R> 2 - drawing 5. As shown in drawing 2 - drawing 5, the lower half of the body 42 which constitutes this end-face closure system 41 is the control section 43 for controlling this system 41. The control-section 43 bottom is protected by the transparent covering 44. Moreover, the control unit 45 is formed in the control-section 43 top and transverse-plane side. The control unit 45 is exposed from said covering 44.

[0021] The scraper 49 grade as the conveyor 46 as a conveyance means, paste restoration equipment 11, the hot plate 48 as a desiccation means, and a sealing agent extra jacket means is held in the hold space which covering 44 and the top face of a control section 43 make.

[0022] The conveyor belts 51 which constitute a conveyor 46 are the shape of endless, and 2. Both the conveyor belts 51 separate fixed spacing mutually in the top-face center section of the control section 43, and are arranged horizontally. Said fixed spacing is short set up a little rather than the die length of the closure-ed object (here honeycomb Plastic solid 7) which is a work piece. That honeycomb Plastic solid 7 should be carried out every width, this comes out in order to make the both ends of honeycomb Plastic solid 7 support on both

conveyor belts 51. As shown in drawing 3 and drawing 4, since the overall length of a conveyor belt 51 is larger than the breadth of a body 42, both the both ends of a conveyor belt 51 have been projected to the exterior of covering 44. Each conveyor belt 51 is infixed in the motor 52 as a driving means, respectively. By the drive of these motors 52, both the conveyor belts 51 convey [drawing 2 and / of drawing 3] honeycomb Plastic solid 7 from right-hand side in the condition every width horizontally to the left lateral. Therefore, in this drawing, the right end side of a conveyor 46 becomes a conveyance side, and becomes a left end side's taking-out side. In addition, the both-ends sides 1a and 1b of honeycomb Plastic solid 7 face in the direction which intersects perpendicularly with a travelling direction at the time of conveyance.

[0023] As shown in drawing 3 and drawing 4, this system 41 is equipped with paste restoration equipment 11. Paste restoration equipment 11 recognizes two or more (this operation gestalt two) existence on the top face of a control section 42. In the middle of a conveyance path, as the paste restoration equipment 11 of a pair sandwiches a conveyor 46, opposite arrangement is carried out. The restoration equipment 11 of a pair is the paste P1 for the closures, where press maintenance of honeycomb Plastic solid 7 is carried out from the both-ends side 1a and 1b side. It is for being filled up. About the detailed structure of paste restoration equipment 11, it mentions later.

[0024] This system 41 is equipped with the 1st work lifter 53. As shown in drawing 2 and drawing 5, the 1st work lifter 53 is arranged upward between the restoration equipment 11 of a pair. The 1st work lifter 53 lifts to a perpendicular honeycomb Plastic solid 7 conveyed to the location of restoration equipment 11 to predetermined height. Here predetermined height points out the height of the metal mask 13 with which restoration equipment 11 is equipped. As this kind of a work lifter 53, an air cylinder etc. is used, for example. It is good at the tip of the rod of an air cylinder to form the stopper structure of making honeycomb Plastic solid 7 conveyed stopping. It raises, and like a paste packer, a condition is maintained until the below-mentioned paste scraping process by the 1st work lifter 53 ends. Then, the 1st work lifter 53 descends to the original height, and releases honeycomb Plastic solid 7 on a conveyor belt 51.

[0025] This system 41 is equipped with the work-piece chuck 54 as a work-piece positioning means. As shown in drawing 4, the work-piece chuck 54 is arranged above the 1st work lifter 53. By grasping the peripheral face side of honeycomb Plastic solid 7 lifted by the 1st work lifter 53, the work-piece chuck 54 positions honeycomb Plastic solid 7, before being filled up.

[0026] This system 41 is equipped with the scraper 49 as a sealing agent extra jacket means. As shown in drawing 3 etc., a scraper 49 recognizes two or more (this operation gestalt two) existence. the scraper 49 of a pair -- paste restoration equipment 11 -- immediately, in the latter part, as a conveyor 46 is inserted, opposite arrangement is carried out. A scraper 49 consists of the blade section 55, the arm section 56, and a driving means 57 that is not illustrated. Two or more blade sections 55 are formed at the tip of the arm section 56. The tip of the arm section 56 extended ahead and has resulted even in said metal mask 13. The end face of the arm section 56 is supported by the driving means 57. A driving means 57 makes the arm section 56 drive two-dimensional horizontally. There are some which two air cylinders were made to intersect perpendicularly for example, and have been arranged as this driving means 57. The drive of the arm section 56 by the driving means 57 is the paste P1 for the closures by paste restoration equipment 11. It is made after restoration is completed. Consequently, paste P1 for the closures adhering to the lateral surface of a mask 13 In front of a desiccation process, it scratches by the blade section 55, it is taken, and is removed.

[0027] This system 41 is further equipped with the hot plate 48 as a desiccation means. As shown in drawing 3 etc., the hot plate 48 recognizes two or more (this operation gestalt two) existence. In the latter part of paste restoration equipment 11 and a scraper 49, as the hot plate 48 of a pair sandwiches a conveyor 46, opposite arrangement is carried out. The heating unit of a hot plate 48 is in a location higher than a conveyor 46. Energization is always made by the heating unit of a hot plate 48. In addition, laying temperature is adjusted by modification of the amount of energization. When honeycomb Plastic solid 7 approaches these heating units, the temperature of end-face 1a of honeycomb Plastic solid 7 and the perimeter of 1b goes up, and it is the paste P1 for the closures. An inner volatile component is removed. Namely, paste P1 for the closures It dries.

[0028] This system 41 is equipped with the 2nd work lifter 58. The 2nd work lifter 58 is arranged near the hot plate 48. As shown in drawing 5, the grasping section of the 2nd work lifter 58 is located in the middle of the hot plate 48 of said pair. Honeycomb Plastic solid 7 conveyed to this location is lifted by the perpendicular to height predetermined in the condition of having been grasped by the grasping section. Here predetermined

height points out height with the heating unit of a hot plate 48. The 2nd work lifter 58 descends to the original height, after the time amount set up beforehand passes. And honeycomb Plastic solid 7 is released on a conveyor belt 51. In addition, as for the drying time of honeycomb Plastic solid 7 by the hot plate 48, it is desirable to be set up to the same extent as the time amount which the paste restoration by said paste restoration equipment 11 takes.

[0029] Next, based on drawing 6 - drawing 10, the concrete configuration of paste restoration equipment 11 is explained. The bearing bracket 59 of a pair is set up by the top face of a control section 43. Opposite arrangement is carried out as these bearing brackets 59 sandwich a conveyor 46. The attachment plate 17 for attaching paste restoration equipment 11 grade is installed in the lateral surface of both the bearing brackets 59. On the other hand, the restoration equipment driving means which is not illustrated, respectively is held in the interior of each bearing bracket 59. These restoration equipment driving means make the horizontal migration of the paste restoration equipment 11 carry out in the direction which intersects perpendicularly in the conveyance direction so that they may move between a shunting location and operating locations for the paste restoration equipment 11 of a pair. In addition, in the operating location which will be in the condition that paste restoration equipment 11 comrades approached, press maintenance of honeycomb Plastic solid 7 is carried out among both 11.

[0030] The paste restoration equipment 11 of this operation gestalt is equipped with the agitator body 14 grade as the tank 19 as an open container, the metal mask 13, and an oscillating grant means. The tank body 12 which constitutes the tank 19 shown in drawing 6 etc. is a metal container for putting in the paste P1 for the closures which is the viscous matter. The up clear aperture 15 is formed in the top face of this tank body 12. This tank body 12 is supported by the attachment plate 17 through the tank holder 16. In addition, the heater which is not illustrated is installed in the tank body 12. This heater is the paste P1 for the closures. The role warmed to constant temperature is played. Free passage opening for aiming at the free passage by the side of the metal mask 13 is formed in one side face of this tank body 12.

[0031] The metal mask 13 is shown in drawing 8. Four corners are beveled and the metal mask 13 is equipped with much openings 21. Said opening 21 is arranged in the shape of a checker in the abbreviation center section of the metal mask 13. Each opening 21 supports the opening location of the through tube 2 of honeycomb Plastic solid 7 which is a closure-ed object. Moreover, as for the dimension of said opening 21, it is good that it is somewhat smaller than opening of the through tube 2 with which it should fill up. Speaking concretely, for the thickness of said metal mask 13, with this operation gestalt, the quality of the material of 0.3mm and the metal mask 13 being [a rectangle and the dimension of opening 21 of the configuration of SUS304 and opening 21] 1.0mm angle - 1.2mm angles.

[0032] As shown in drawing 6, drawing 9, etc., the metal mask 13 is installed in the field of the side which has one side face in a tank 19, i.e., said free passage opening. Speaking more concretely, fixing two support plates 22 and 23 and the rubber plates 24, and the two masks stationary plates 25 and 26 to the side face concerned in a tank body 12. The through tube is formed in the abbreviation center section of these plates 22-26, respectively. And the metal mask 13 is being fixed after having been pinched by the two masks stationary plates 25 and 26.

[0033] As shown in drawing 6, the agitator body 14 as an oscillating grant means is constituted by the motor 31 as a driving means, an eccentric shaft 32, pins 33 and 37, the link plate 34, the stirring arm 35, and the piece of stirring 36 grade of a pair. The motor 31 is being fixed to the upper limit section of said attachment plate 17 by every side. The eccentric shaft 32 is formed in the output shaft of the motor 31 which projects horizontally. The bearing is prepared in the upper limit and lower limit of the link plate 34, respectively. Pins 33 and 37 are supported in the state of insertion by these bearings, respectively. The upper limit side of the link plate 34 and the eccentric shaft 32 are connected by the pin 33. On the other hand, the upper limit side of the lower limit side of the link plate 34 and the stirring arm 35 is connected by the pin 37. Therefore, if the rotation drive of the motor 31 is carried out, rotation of an eccentric shaft 32 will be changed into the rectilinear motion (here reciprocating motion to the vertical direction) of the stirring arm 35.

[0034] The stirring arm 35 is prolonged perpendicularly and the lower limit is inserted in the interior of a tank 19 from the up clear aperture 15 of a tank body 12. The stirring arm 35 is the paste P1 for the closures by own rectilinear motion. By giving vibration directly, opening 21 is external surface [of the metal mask 13] minded, and it is the paste P1 for the closures. The role sent out gradually is played. Viscous paste P1 for the closures In

order to lessen migration resistance in inside, the stirring arm 35 is formed in tabular. In the lower limit of the stirring arm 35, the piece of a metal crooked in the shape of an abbreviation KO character has fixed. Consequently, the piece 36 of stirring of said pair is formed. These pieces 36 of stirring have separated predetermined spacing, and are in parallel physical relationship. Moreover, the stirring side of the piece 36 of stirring lies at right angles to the reciprocation direction of the stirring arm 35. In addition, a stirring operation becomes it weak that the lower limit of the stirring arm 35 is a simple configuration, and the reason for having formed the above pieces 36 of stirring is the paste P1 for the closures. It is because there is a possibility that it may become impossible to fully stir.

[0035] Speaking concretely, with this operation gestalt, the both-way migration stroke of the stirring arm 35 as suitable range to 3mm - 15mm To a part for /, the clearance between piece of stirring 36 a part for /-, and 360 times 60 times for the count of reciprocation of the stirring arm 35 to 5mm - 25mm The clearance from the free end of the piece 36 of stirring to the medial surface of the metal mask 13 is set as 2mm - 30mm, and the dimension of the piece 36 of stirring is set as 30mmx30mmx3mm, respectively. Moreover, said paste P1 for the closures It is 30000cps - 60000cps about viscosity. It has set up.

[0036] As drawing 9 is shown roughly, in the tank body 12 of this tank 19, it is said paste P1 for the closures. It is put in. In this case, the oil level 8 of the paste P1 for the closures always needs to be held in a location higher than the opening formation field of the metal mask 13. Otherwise, it is because there is a possibility that a fill may vary or a non-filling part may be made. The tank body 12 is equipped with the up clear aperture 15. The paste supply means which is not illustrated is the up clear aperture 15 to the paste P1 for the closures. It supplies serially. In addition, atmospheric pressure has always joined the oil level 8 located in the up clear aperture 15 (refer to the extraction arrow head of drawing 9). however, paste P1 for the closures **** --, it is viscous and, moreover, the size of opening 12 is fully small. Therefore, it sets in the condition that vibration is not given and is the paste P1 for the closures by operation of only atmospheric pressure. It seems that it does not begin to leak from opening 21 automatically.

[0037] The piece 36 of stirring of the pair which is in the lower limit on the other hand when the stirring arm 35 is made to reciprocate in the vertical direction also reciprocates in the vertical direction, and, thereby, it is the paste P1 for the closures. It stirs. then, the thing which said atmospheric pressure acts -- adding -- paste P1 for the closures vibration is given directly -- paste P1 for the closures the outside of the metal mask 13 -- every [small quantity] -- it is sent out gradually.

[0038] Next, honeycomb filter F1 The procedure to manufacture is explained. First, honeycomb Plastic solid 7 and the paste P1 for the closures The process to manufacture is performed. Then, honeycomb Plastic solid 7 is continuously supplied to the carrying-in side in the conveyor 46 of the end-face closure system 41. At this time, honeycomb Plastic solid 7 is carried out every width on the conveyor belt 51 of a pair. Honeycomb Plastic solid 7 with which only predetermined distance was conveyed is lifted to predetermined height while stopping with the 1st work lifter 53. Consequently, each end faces 1a and 1b of honeycomb Plastic solid 7 will be in the condition of having stood face to face against the metal mask 13, respectively. At this time, paste restoration equipment 11 is still held in the shunting location.

[0039] Next, the end faces 1a and 1b of honeycomb Plastic solid 7 are positioned to the metal mask 13 by grasping lifted honeycomb Plastic solid 7 by the work-piece chuck 54. When it says more accuracy, that with which it should fill up among the through tubes 2 which carry out opening in end faces 1a and 1b is made to correspond to each opening 21 currently formed in the metal mask 13. After positioning of honeycomb Plastic solid 7 is completed, both paste restoration equipment 11 is moved to an operating location from a shunting location by the drive of a restoration equipment driving means. Then, both the metal mask 13 approaches mutually and sticks to the both-ends sides 1a and 1b of honeycomb Plastic solid 7. Consequently, honeycomb Plastic solid 7 is held in the state of positioning by being pressed from the end-face 1a and 1b side, and the operation of it like a packer is attained.

[0040] Subsequently, start the drive of a motor 31, the stirring arm 35 and the piece 36 of stirring are made to reciprocate in the vertical direction, and it is the paste P1 for the closures. It stirs at predetermined time and a predetermined rate, and is the paste P1 for the closures. A suitable vibration is given. Thus, paste P1 for the closures Opening of a through tube 2 is closed by sending out only the specified quantity to the lateral surface of the metal mask 13. After paste restoration is completed and making the drive of a motor 31 stop beforehand, paste restoration equipment 11 is returned to a shunting location in order to make the metal mask 13 estrange

from honeycomb Plastic solid 7. Next, paste P1 for the closures which has adhered to the lateral surface of the metal mask 13 by making a scraper 49 drive It scratches in the blade section 55 (refer to drawing 7).
 [0041] After a paste scraping process completes a paste packer, the 1st work lifter 53 is dropped and honeycomb Plastic solid 7 is released on a conveyor belt 51. If honeycomb Plastic solid 7 is again conveyed only for predetermined distance, while stopping honeycomb Plastic solid 7 with the 2nd work lifter 58, it will be shortly raised by the height of the heating unit of a hot plate 48. If predetermined time passes and a desiccation process is completed, the 2nd work lifter 58 will descend and will release honeycomb Plastic solid 7 on a conveyor belt 51. Then, honeycomb Plastic solid 7 is conveyed to the taking-out section, and is taken out from there by the exterior of the end-face closure system 41.

[0042] They are honeycomb Plastic solid 7 and the paste P1 for the closures by subsequently calcinating at predetermined time and predetermined temperature, if a series of processes are completed as mentioned above. It is made to sinter. Consequently, honeycomb filter F1 shown in drawing 1 It can obtain.

[0043] Now, in this operation gestalt, the characteristic operation effectiveness is enumerated below.

(b) Paste P1 for the closures according to paste restoration equipment 11 like the above at this operation gestalt By being filled up, the closure of the end faces 1a and 1b of honeycomb Plastic solid 7 is carried out continuously. Therefore, compared with the former which depended for restoration on the help, productivity improves certainly. Moreover, since opposite arrangement of the paste restoration equipment 11 of a pair is carried out, while the conveyor 46 is conveying honeycomb Plastic solid 7, it is the paste P1 for the closures. Coincidence can be filled up about both end faces 1a and 1b. Therefore, paste P1 for the closures Compared with the former which needed to be filled up every [single-sided], the time amount which an end-face closure activity takes becomes very short. This also contributes to improvement in productivity.

[0044] (b) Paste P1 for the closures which is viscous with this operation gestalt Paste restoration is performed using paste restoration equipment 11 equipped with the metal mask 13 which has the tank 19 to put in and opening 21, and is installed in the side face of a tank 19, and the agitator body 14. paste P1 for the closures into which it was put in the tank 19 **** -- atmospheric pressure is always added. this condition -- paste P1 for the closures if vibration is given -- opening 21 -- minding -- paste P1 for the closures the lateral surface of the metal mask 13 -- every [small quantity] -- it is sent out gradually. Therefore, if honeycomb Plastic solid 7 is positioned and arranged to the lateral surface of the metal mask 13, it will be the paste P1 for the closures to opening of a through tube 2 by operation of said atmospheric pressure and vibration. The specified quantity and homogeneity can be filled up. Therefore, the end faces 1a and 1b of honeycomb Plastic solid 7 can be closed certainly.

[0045] Moreover, it is the paste P1 for the closures by adjusting suitably the magnitude, time amount, etc. of vibration with this paste restoration equipment 11. A fill is certainly [easily and] controllable. Therefore, this paste restoration equipment 11 is the application F1 which closes the detailed through tube 2 existing [many], i.e., a honeycomb filter. It is extremely suitable for the application of this operation gestalt of the end-face closure in manufacture.

[0046] (c) Since this paste restoration equipment 11 is equipped with the metal mask 13, unlike the former, the film for the closures which blockades the through tube 2 with which it should be filled up in honeycomb Plastic solid 7, and which does not come out becomes unnecessary. Therefore, the troublesome film attachment activity and film exfoliation activity by the help are no longer required. Furthermore, paste P1 for the closures Homogeneity is filled up and, moreover, it is the paste P1 for the closures. As a result of stopping adhering to the edge outside peripheral surface of honeycomb Plastic solid 7, the troublesome correction by the help is no longer required. A routing counter decreases certainly from the above thing, and productivity improves.

[0047] (d) When this paste restoration equipment 11 is used, it becomes unnecessary to make the expensive film for the closures throwing away furthermore. Therefore, the futility of an ingredient is lost and cost nature improves compared with the former.

[0048] (e) Use the motor 31, the link plate 34, the stirring arm 35, and the agitator body 14 constituted by piece of stirring 36 grade as an oscillating grant means with this paste restoration equipment 11. Moreover, it is inserted from the up clear aperture 15 of a tank 19, and the stirring arm 35 and the piece 36 of stirring which are some agitator bodys 14 are the paste P1 for the closures by the reciprocation to the own vertical direction. It stirs. for this reason, paste P1 for the closures **** -- vibration gives directly -- having -- it -- having -- paste P1 for the closures It is sent out to the external surface side of the metal mask 13. It is [vibrating a tank 19 side

temporarily as it is such a configuration, and] the paste P1 for the closures. Compared with the case where vibration is given indirectly, the driving force of a motor 31 is small and ends. This is because a big thing is not driven like a tank 19 but it is only sufficient to stir the viscous matter. And since a big driving means is not needed, complication of mechanical structure is avoided. Cost nature improves further from the above thing.

[0049] (Passing) This end-face closure system 41 is the paste P1 for the closures to the latter part of paste restoration equipment 11. It has the hot plate 48 for making it dry as a desiccation means. Therefore, paste P1 for the closures Desiccation is not based on a help but, moreover, is performed continuously. Moreover, since the both-ends sides 1a and 1b are dried by coincidence with the hotpress plate 48 which carried out opposite arrangement as sandwiched the conveyor 46, the time amount which an activity takes becomes short certainly. These things are contributing to much more improvement in productivity.

[0050] (g) This end-face closure system 41 is the paste P1 for the closures adhering to the lateral surface of the metal mask 13. It has the scraper 49 for removing before operation of a desiccation process as a sealing agent extra jacket means. Therefore, paste P1 for the closures Scraping is not based on a help but, moreover, is performed continuously. Moreover, since a scraping activity is done on coincidence about both metal masks 13 by the scraper 49 which carried out opposite arrangement as sandwiched the conveyor 46, the time amount which an activity takes becomes short certainly. These things are contributing to much more improvement in productivity similarly.

[0051] (h) This end-face closure system 41 is equipped with the work-piece chuck 54 for positioning honeycomb Plastic solid 7 as a positioning means before the operation like a paste packer. Therefore, since positioning of honeycomb Plastic solid 7 over the metal mask 13 is not based on a help but is moreover performed continuously, much more improvement in productivity can be aimed at also by this. Moreover, paste P1 for the closures resulting from a location gap There is also an advantage that leakage is prevented beforehand.

[0052] In addition, it is not limited to the above-mentioned operation gestalt, for example, this invention can be changed into the following gestalten.

O A desiccation means is not limited to a hot plate 48 like an operation gestalt, for example, seems to spray air on the both-ends sides 1a and 1b of honeycomb Plastic solid 7.

[0053] O Paste P1 for the closures A scraper 49 can be omitted when not adhering to the metal mask 13 so much.

O As shown in drawing 10 , when press maintenance of honeycomb Plastic solid 7 is carried out from the both-ends side 1a and 1b side with the paste restoration equipment 11 of a pair, on the whole, paste restoration equipment 11 the very thing may be vibrated. When it does in this way, it is the paste P1 for the closures. By vibration being given indirectly, it is the paste P1 for the closures. It fills up in a through tube 2. However, mechanical structure tends to become complicated when constituted in this way. Therefore, about this point, the configuration of an operation gestalt is more advantageous.

[0054] O Carrying out a packer degree and a desiccation process in height as it is is also permitted without lifting honeycomb Plastic solid 7 with the 1st work lifter 53 and 2nd work lifter 58.

[0055] O The paste restoration equipment of a configuration of differing from an operation gestalt and paste restoration equipment 11 may be used. In that case, an agitator body may be constituted using a screw etc. Moreover, it is the paste P1 for the closures by approaches other than stirring. What gives vibration, for example, ultrasonic rocking equipment, bubbling equipment, etc. may be adopted as an oscillating grant means. However, it is desirable that it is an agitator body 14 too like said operation gestalt, considering the point that the controllability of a fill is high.

[0056] O The paste restoration equipment used for this end-face closure system 41 is the paste P1 for the closures ** for example, according to oscillating grant. You may be the thing of the type with which it is filled up.

O The paste sealing arrangement 11 of a pair may not be of the same kind like an operation gestalt, and it is also possible to use combining a thing of a different kind.

[0057] O It is also possible to adopt the conveyor which conveys honeycomb Plastic solid 7 every condition which is not every width, for example, length, in the condition as a conveyance means. Moreover, the conveyance direction by the conveyance means may not necessarily be restricted horizontally, and may be perpendicularly etc. Furthermore, the conveyor 46 of an operation gestalt is possible also for using the

conveyance means of a different type. In addition, to perform conveyance in the condition every length as mentioned above, it is necessary to change the installation of the metal mask 13 into not the side face of a tank 19 but the base of a tank 19, or a top face.

[0058] Here, the technical thought grasped according to the operation gestalt mentioned above is enumerated below with the effectiveness besides the technical thought indicated by the claim.

(1) The end-face closure system characterized by having a desiccation means for making the latter part of said restoration equipment dry said sealing agent in any 1 term of claims 1-3. Since desiccation of a sealing agent is not based on a help as it is this configuration, but it is moreover carried out continuously, productivity can be improved further.

[0059] (2) The end-face closure system characterized by having a sealing agent extra jacket means for removing before drying said sealing agent adhering to said mask lateral surface in claims 1-3 and any 1 term of the technical thought 1. Since scraping of a sealing agent is not based on a help as it is this configuration, but it is moreover carried out continuously, productivity can be improved further.

[0060] (3) It is the end-face closure system characterized by carrying out opposite arrangement as said desiccation means and said sealing agent extra jacket means sandwich said conveyance means in the technical thought 1 and 2.

[0061] (4) The end-face closure system characterized by having a positioning means for positioning said closure-ed object before the operation like a sealing agent packer in claims 1-3 and any 1 term of the technical thought 1-3. Since positioning of a closure-ed object [as opposed to / that it is this configuration / a mask] is not based on a help but is moreover performed continuously, productivity can be improved further.

[0062] (5) It is the end-face closure system characterized by for said oscillating grant means being an agitator body inserted into this open container from the up clear aperture of said open container in claim 3, and the agitator body giving vibration directly to said sealing agent by own rectilinear motion. According to this configuration, when a sealing agent is stirred by the rectilinear motion of an agitator body, vibration is directly given to a sealing agent and a sealing agent is sent out to the outside of a mask. Compared with the case where vibration is indirectly given to the viscous matter, driving force is small, and can be managed with vibrating an open container, and, moreover, complication of structure is avoided. So, cost nature improves further.

[0063] In addition, the terminology used into this specification is defined as follows.

"Ceramic sintered compact : Say a silicon carbide sintered compact, an alumina sintered compact, a silicon nitride sintered compact, a cordierite sintered compact, etc."

[0064]

[Effect of the Invention] As explained in full detail above, according to invention according to claim 1 to 3, the end-face closure system which can aim at improvement in productivity and cost nature can be offered.

[0065] Since the time amount which an end-face closure activity takes becomes very short according to invention according to claim 2, productivity can be raised more. According to invention according to claim 3, productivity and cost nature can be raised further.

[0066] According to invention according to claim 4, the manufacture approach of a honeycomb filter that improvement in productivity and cost nature can be aimed at can be offered.

[Translation done.]

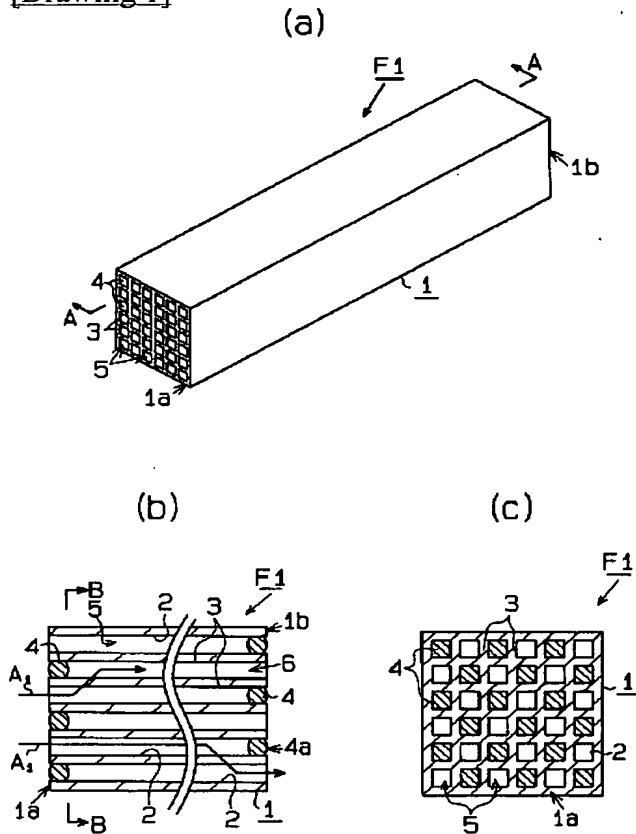
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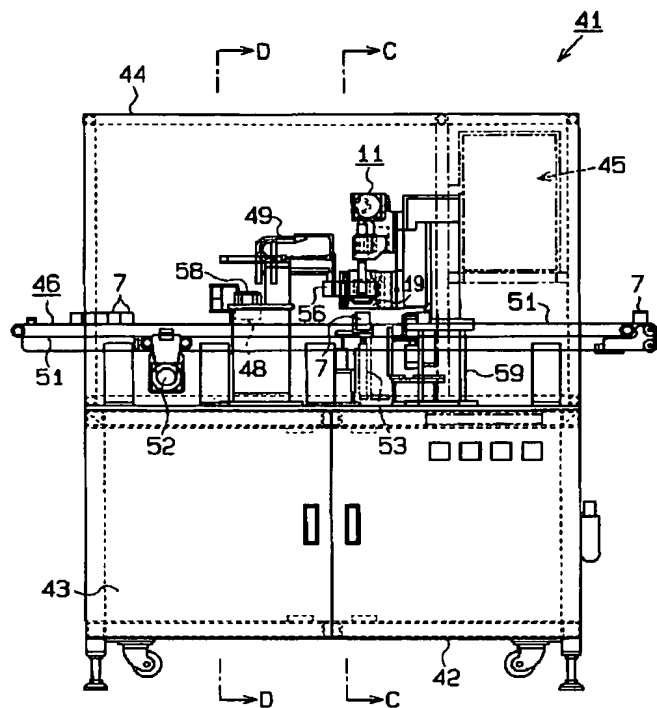
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DRAWINGS

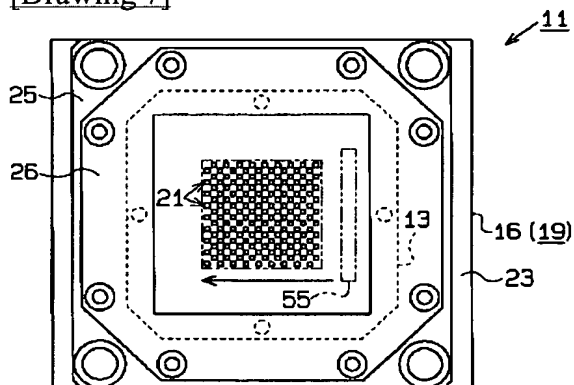
[Drawing 1]



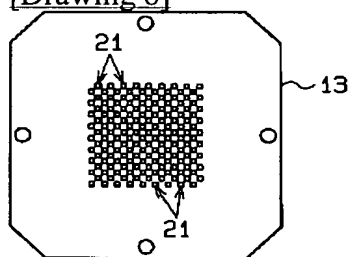
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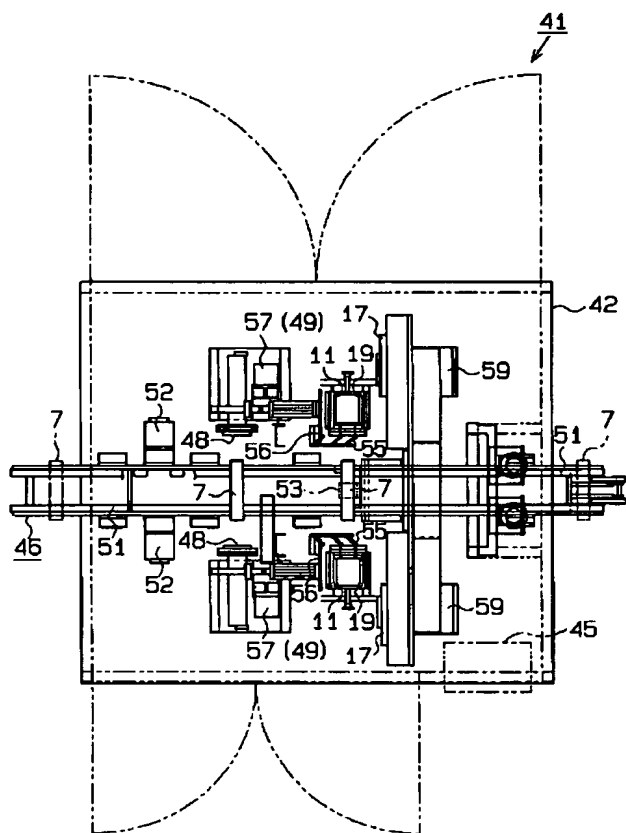
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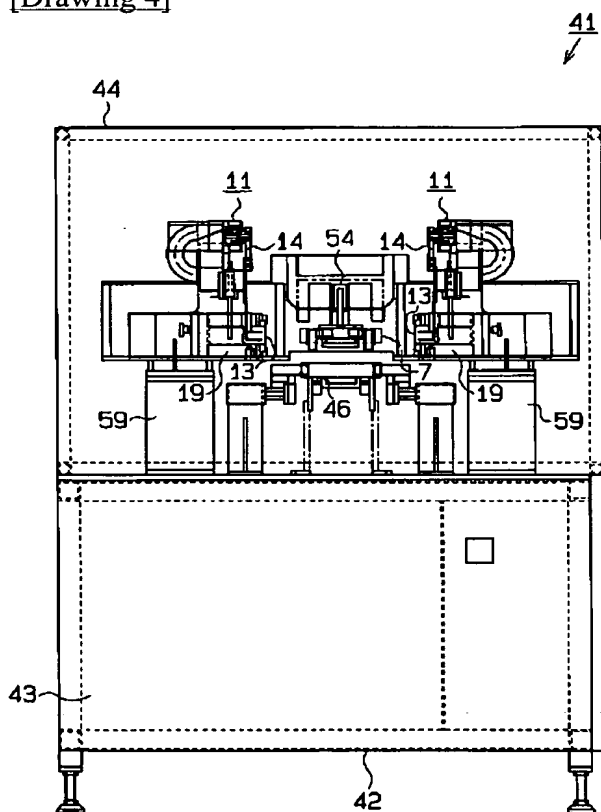
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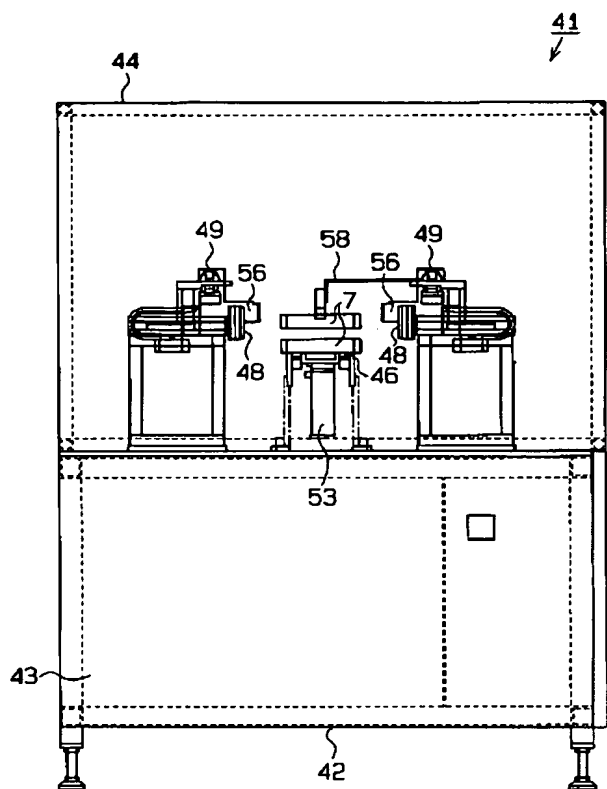
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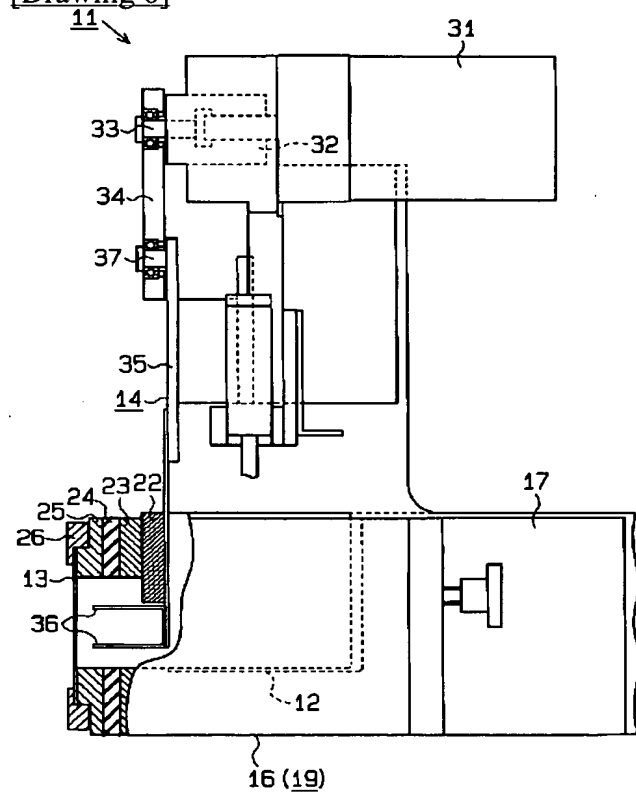
[Drawing 4]



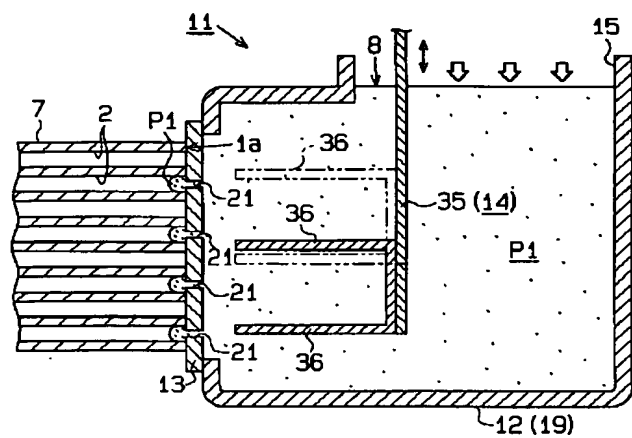
[Drawing 5]



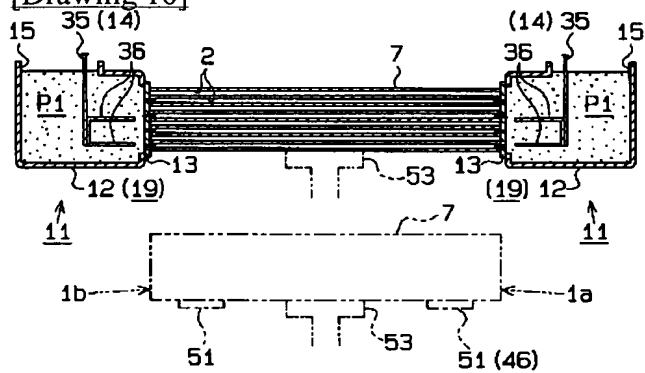
[Drawing 6]



[Drawing 9]



[Drawing 10]



[Translation done.]